

We claim:

1. A method of modifying a polypyrrolic macrocycle, said method comprising

5 reacting said macrocycle with a carbonyl ylide capable of forming a cyano containing macrocycle under refluxing conditions to produce a cyano containing compound, and

reducing a cyano group of said compound with a reducing agent to produce an amine group.

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2. The method of claim 1 wherein said carbonyl ylide is tetracyanoethylene oxide (TCNEO).

15 3. The method of claim 1 wherein said macrocycle is a photosensitizer.

4. The method of claim 3 wherein said photosensitizer is a porphyrin.

5. The method of claim 4 wherein said porphyrin is a tetraphenylporphyrin (TPP) or a diphenylporphyrin (DPP).

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6. The method of claim 1 wherein said reducing agent is lithium aluminum hydride.

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7. A method of modifying a polypyrrolic macrocycle, said method comprising

reacting said macrocycle with a carbonyl ylide capable of forming a cyano containing macrocycle under refluxing conditions to produce a cyano containing compound, and

hydrolyzing a cyano group of said compound to produce an acid or carboxylate moiety.

8. The method of claim 7 further comprising derivatization of said acid or
5 carboxylate moiety to be an ester, amide, or thioamide.

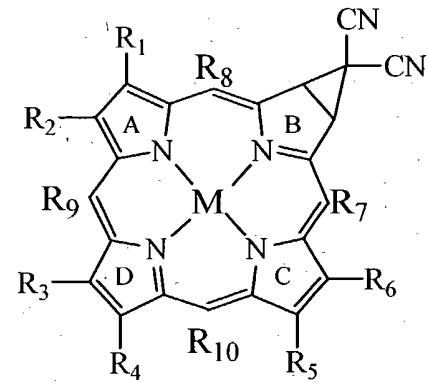
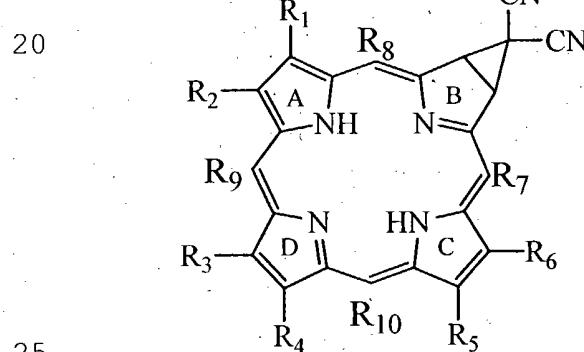
9. The method of claim 7 wherein said carbonyl ylide is tetracyanoethylene oxide (TCNEO).

10. The method of claim 7 wherein said macrocycle is a photosensitizer.

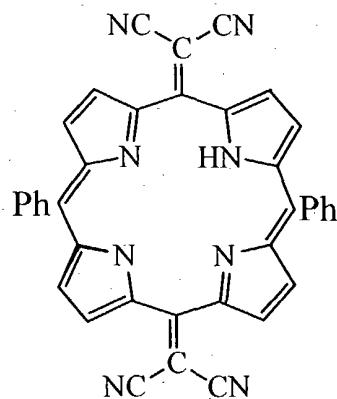
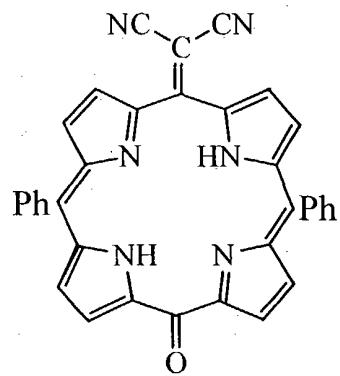
11. The method of claim 10 wherein said photosensitizer is a porphyrin.

12. The method of claim 11 wherein said porphyrin is a tetraphenylporphyrin
15 (TPP) or a diphenylporphyrin (DPP).

13. The method of claim 1 wherein said cyano containing compound has a structure represented by one of formulas III, IV, (1), (2), (3) or (4) below



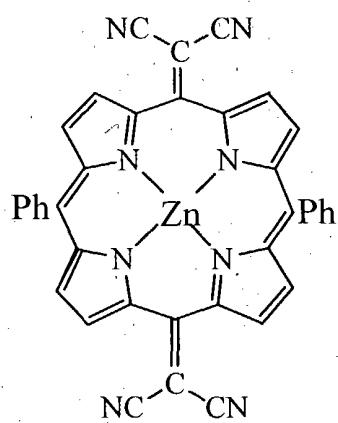
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(1)

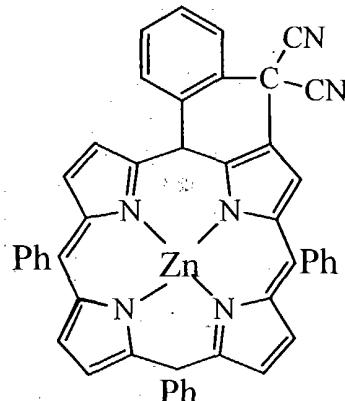
(2)

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or



wherein

(3)

(4)

M is a metal selected from the group consisting of Ni(II), Cu(II), Zn, Sn, Ge, Si, Ga, Al, Mn(III), Gd(III), In and Tc;

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R₁ through R₆ are independently a hydrogen atom, a lower alkyl group, a lower alkyl carboxylic acid or acid ester group, keto, hydroxy, nitro, amino, or a group that, taken together with another pyrrolic ring, ring substituent or meso-substituent, forms a fused 5- or 6-membered ring; and each of R₇ through R₁₀ is independently selected from H, substituted or unsubstituted alkyl groups, or substituted or unsubstituted aromatic rings,

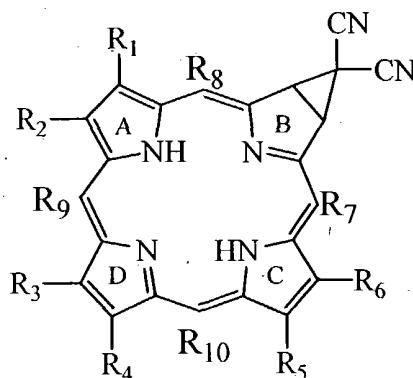
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or substituted or unsubstituted cycloalkyl groups, which may be the same or different; and

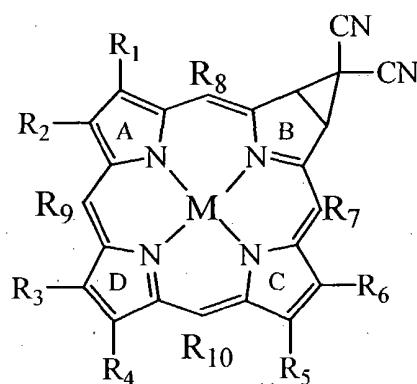
Ph is phenyl.

5 14. The method of claim 7 wherein said cyano containing compound has a
structure represented by one of formulas III, IV, (1), (2), (3) or (4) below

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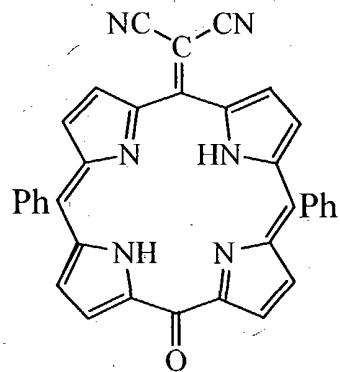
III



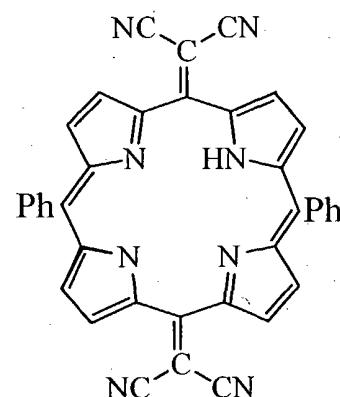
IV

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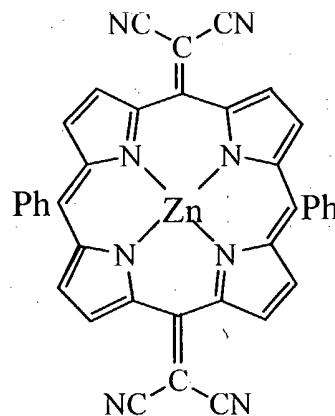
(1)



(2)

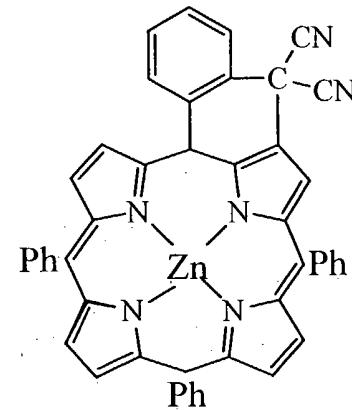
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or



wherein

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M is a metal selected from the group consisting of Ni(II), Cu(II), Zn, Sn, Ge, Si, Ga, Al, Mn(III), Gd(III), In and Tc;

20

R₁ through R₆ are independently a hydrogen atom, a lower alkyl group, a lower alkyl carboxylic acid or acid ester group, keto, hydroxy, nitro, amino, or a group that, taken together with another pyrrolic ring, ring substituent or meso-substituent, forms a fused 5- or 6-membered ring; and each of R₇ through R₁₀ is independently selected from H, substituted or unsubstituted alkyl groups, or substituted or unsubstituted aromatic rings, or substituted or unsubstituted cycloalkyl groups, which may be the same or different; and

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Ph is phenyl.

15. A compound produced by the method of claim 1.

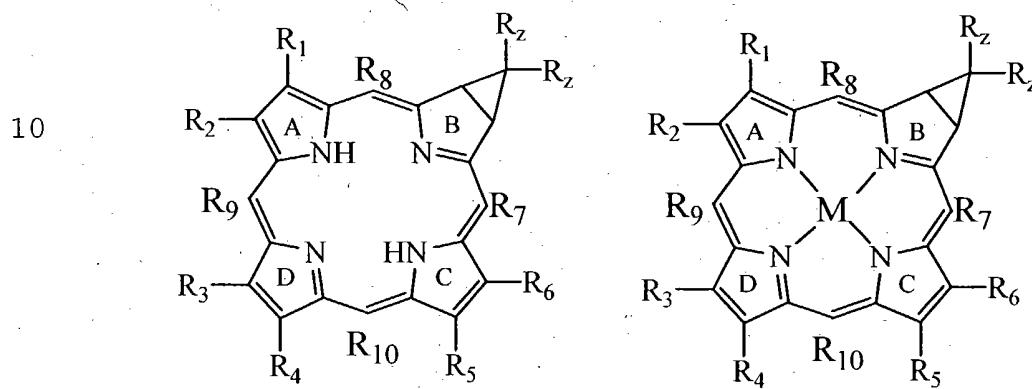
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16. A compound produced by the method of claim 6.

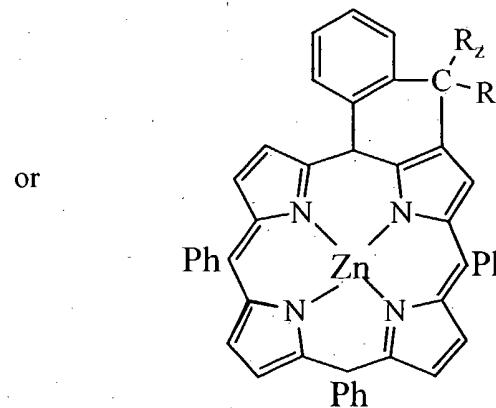
17. A compound produced by the method of claim 7.

18. A compound produced by the method of claim 8.

5 19. The compound of claim 16 having a structure represented by one of the
following formulas



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wherein

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M is a metal selected from the group consisting of Ni(II), Cu(II), Zn, Sn, Ge, Si,
Ga, Al, Mn(III), Gd(III), In and Tc;

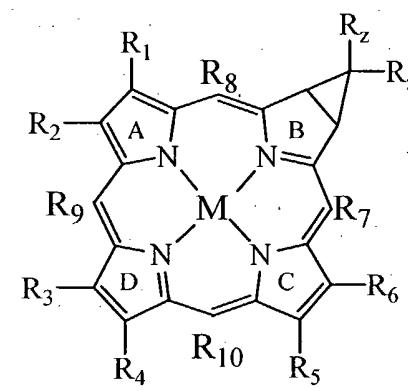
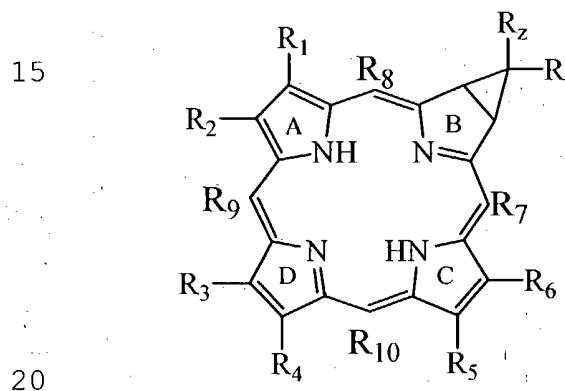
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R₁ through R₆ are independently a hydrogen atom, a lower alkyl group, a lower alkyl carboxylic acid or acid ester group, keto, hydroxy, nitro, amino, or a group that, taken together with another pyrrolic ring, ring substituent or meso-substituent, forms a fused 5- or 6-membered ring; and

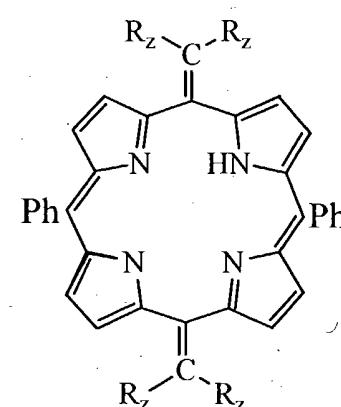
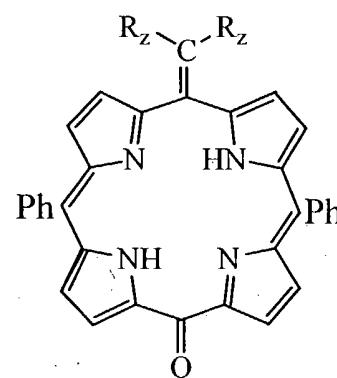
5 each of R₇ through R₁₀ is independently selected from H, substituted or unsubstituted alkyl groups, or substituted or unsubstituted aromatic rings, or substituted or unsubstituted cycloalkyl groups, which may be the same or different; and

10 Ph is phenyl and -R_z is -CN where one or more -R_z is -CH₂NH₂ resulting from reduction of said -CN.

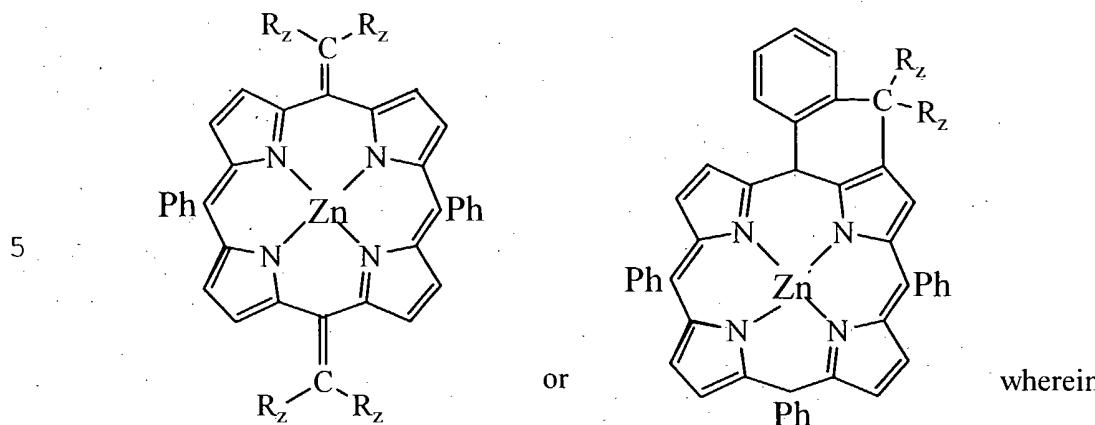
20. The compound of claim 17 having a structure represented by one of the following formulas



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10 M is a metal selected from the group consisting of Ni(II), Cu(II), Zn, Sn, Ge, Si, Ga, Al, Mn(III), Gd(III), In and Tc;

15 R₁ through R₆ are independently a hydrogen atom, a lower alkyl group, a lower alkyl carboxylic acid or acid ester group, keto, hydroxy, nitro, amino, or a group that, taken together with another pyrrolic ring, ring substituent or meso-substituent, forms a fused 5- or 6-membered ring; and

each of R₇ through R₁₀ is independently selected from H, substituted or unsubstituted alkyl groups, or substituted or unsubstituted aromatic rings, or substituted or unsubstituted cycloalkyl groups, which may be the same or different; and

20 Ph is phenyl and -R_z is -CN where one or more -R_z is -COOH resulting from hydrolysis of said -CN.